

NONWOVEN ELASTIC FIBROUS WEBS AND METHODS FOR MAKING THEM

Abstract

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A coherent nonwoven fibrous web comprises directly formed elastic fibers that have a molecular orientation sufficient to provide a birefringence number of at least 1×10^{-5} and preferably at least 1×10^{-2} . The web can be made by a method that comprises a) extruding filaments of elastic-fiber-forming material; b) directing the filaments through a processing chamber in which gaseous currents apply a longitudinal stress to the filaments that attenuates and draws the filaments; c) maintaining the filaments at their orienting temperature while the filaments are under attenuating and drawing stress for a sufficient time for molecules within the filaments to become oriented along the length of the filaments; d) cooling the filaments to their orientation-locking temperature while the filaments are under attenuating and drawing stress and further cooling the filaments to a solidified fiber form; and e) collecting the solidified fibers as a fibrous nonwoven web. In a preferred aspect, the method includes the further step of annealing the collected fibers by exposing them to a temperature that is above their shrinking temperature but less than their relaxation temperature, and preferably bonding the fibers after (or before) the annealing step. Dimensionally stable webs comprising elastic oriented fibers are obtained.